MODELS

RA8000 Fibre Channel

Fibre Channel Storage solution with industry-leading storage area network (SAN) support uses arbitrated loop (FC-AL) and the latest switched fabric (FC-SW) technology. It provides data protection, high availability, exceptional performance, unlimited capacity, and multi-vendor platform support for the most demanding storage requirements.

Departmental Pedestal Models

RA8000 FC Single Controller
380550-B21/B22 Blue/Opal

RA8000 FC Dual Controller
380560-B21/B22 Blue/Opal

Expansion cabinet 24 slot
380570-B21/B22 Blue/Opal

Rack Mountable Models

RA8000 FC Single Controller
380660-B21

RA8000 FC Dual Controller
380670-B21

Rackable 24 Slot Expansion
380568-B21

See text for FC hubs, FC switches, platform software, host adapters, disks and options for complete solutions.

What is Storage Services Bundling?

The Storage Services Bundling takes the existing storage products along with the existing services and creates bundles of storage hardware/software and appropriate services. The increased level of support provides for a higher level of storage system availability for the customer.

OVERVIEW

StorageWorks ™ RAID Array 8000 Fibre Channel (RA8000 FC) by Compaq

RA8000 FC is a fully integrated FC storage solution. It is the outgrowth of years of *StorageWorks* experience, delivering quality solutions into applications in which the name *StorageWorks* has become synonymous with mission critical requirements.

RA8000 FC is designed to span a broad range of needs, providing an affordable entry price with scalable capacity, with built-in and optional features for multi-vendor operating environments, high availability requirements, and the most demanding performance requirements. The RA8000 capability list includes: single and dual redundant controller operation, up to four active-active host communication paths, shared storage access for heterogeneous operating systems, and hot swappable components. Optional software to support “no single point of failure” with dual pathing, remote data replication and volume management is available as layered products.

In environments having requirements for continuously increasing capacity, performance and high levels of reliability the RA8000 FC is the clear choice.

FC Technology

RA8000 takes advantage of the benefits of fibre channel in distance, performance and connectivity. The use of optical fiber cabling allows distances between connected segments to be standard at up to 500 meters, using short-wave, multi-mode cable and optionally up to 10 kilometers when using long-wave single mode cable between FC switches. The rated speed of FC is 100 MB per second on each path. RA8000 storage area networks (SANs) can be constructed using 8- or 16-port switches for fabric connectivity (FC-SW) and 7 or 12 port hubs for arbitrated loop (FC-AL) connectivity.

RA8000 Product Packaging

RA8000 products are available in desk-high departmental pedestal cabinets and in rack mountable models with universal brackets for use in Compaq racks, such as the Model 7142, the Model 9000 family and ESA12000 cabinets or industry-standard metric or retma cabinets. Cabinets are available in top gun blue, in beach gray, and in opal colors to complement existing customer equipment.

COMPAQ

OVERVIEW *(continued)*

Multi-Vendor Operating System Support

Support for industry-leading operating systems including: Windows NT, Windows 2000, Novell NetWare®, Tru64™ UNIX, Sun Solaris™, IBM AIX, HP-UX, OpenVMS, Linux, and SGI IRIX. Visit www.compaq.com for the latest operating system support information and platform connection kit availability.

High Availability

All RA8000 models provide redundant cooling, N+1 power redundancy and an environmental monitoring facility. *StorageWorks* disks and all RA8000 components are hot-swap. RA8000 FC can be used with single controllers to provide data integrity or optionally the RA8000 can be equipped with dual controllers operating in dual redundant mode with the ability for controller fail-over if a controller fails. Each controller has a pair of FC host ports, and in the event of a path failure, the controllers can automatically fail-over to the remaining path.

No-Single-Point-Of-Failure

Dual Host Bus Adapter (HBA) fail-over software is supported on with selected operating systems, the RA8000 FC redundant architecture eliminates single points-of-failure from server to storage in clustered or single server configurations.

Clustered Server and High Availability System Support

Dual and multi-node cluster support provides host level fault tolerance and high system availability. Microsoft Cluster Server (MSCS) support for Windows NT and Windows 2000 platforms, Tru Clusters support on Tru64 UNIX, OpenVMS clusters. Multi-vendor HA support with HACMP, VERITAS FirstWatch, and VERITAS Cluster server for SUN, and MC ServiceGuard on HP-UX. Visit www.compaq.com for additional support information.

Multi-Server Shared Support for Storage Consolidation

Heterogeneous and homogeneous host support provide the ability to share storage among multiple servers. The RA8000 FC provides storage access control, assuring that a host cannot access data intended for exclusive access by other hosts.

Fibre Channel Switch Support (FC-SW)

Support for 8- and 16-port fibre channel switches allows a customer to receive the full benefits of a storage area network (SAN), providing exceptional connectivity while increasing the effective bandwidth of the network. Supported SAN features include zoning for communication isolation, switch to switch segments up to 10 km, and FC-AL connection using FL ports using public loop or Brocade Quickloop™ port handling. Visit www.compaq.com for specific operating system support information.

Fault Tolerance

Redundant power supplies, fans, controllers, cache battery backup, hot global spare drives and a multi-level RAID architecture (0, 1, 3/5, 1+0) ensure fault tolerance against system outages and data loss.

Remote Data Replication for Disaster Tolerance Applications

Optional software products provide remote mirroring using the fibre channel array controller. This allows a host system to copy critical data to a system at a remote location through an optical fibre link.

Scalability

A choice of 9-GB, 18-GB, and 36-GB 1.6-inch Ultra-SCSI drives in a modular 24 drive array enclosure with expansion to 48 or 72 drives allows up to 2.6 TB (72 x 36 GB) of storage capacity in a single storage system. Any number of storage systems can be used in a configuration for unlimited capacity.

Performance

Fibre Channel host connections provide up to 100 MB/s bandwidth for each path. Each controller has two FC host ports or four ports in dual redundant controllers, assuring the availability of bandwidth for the most stringent applications. In addition, up to 512 MB of cache memory per controller and up to 1 GB of cache per controller pair ensures high controller performance. Mirrored cache write capability maintains optimal performance while assuring data integrity in the event of a failure.

Bandwidth

The RA8000 has two Fibre Channel ports per storage controller or redundant controller pair. Each controller-to-host interface is rated at 100 MB/s for 200 MB/s available capacity in each controller.

Hot Plug Drives

Hot Plug SCSI back-plane allows drives to be added and removed without powering down the system.

OVERVIEW *(continued)*

Manageability

StorageWorks Command Console (SWCC) provides a graphical user interface (GUI) to set up/configure, monitor, and trouble-shoot storage subsystems.

Servers

- ProLiant Servers including 1600,1850R, 3000, 5500, 6000, 6400, 6500, 7000, 8000, 8500 with Windows NT, Windows 2000, and NetWare. Linux support on selected ProLiant servers.
- AlphaServers with OpenVMS, Tru64 Unix, and Linux
- Multi-vendor SUN, HP, IBM, SGI and x86 servers

Check www.compaq.com for up to date platform information for ProLiant, multi-vendor and specific platform and operating system version support.

OPTIONS

Controller Software	ACS V8.5F Controller FC-AL/FC-SW software.	128697-B21 (See below for prior V8.4F software version.)
	ACS V8.5G Controller FC-AL only software	(See www.compaq.com for latest information.)
	ACS V8.5S Controller, FC-SW and Snapshot Software	160091-B21 (Consult EVM (Enterprise Volume Manager) product information for usage.)
	ACS V8.5P Controller, FC-SW and DRM Software	128698-B21 (Consult DRM product information for usage.)
	ACS V8.3 Controller FC-AL Software	380577-001
	ACS V8.4F Controller FC-SW Software	160089-B21
	ACS V8.4P Controller software for FC-SW and DRM.	160090-B21
OS Software/Platform Kits Visit www.compaq.com for availability.	Windows 2000/ProLiant/x86, Windows NT/ProLiant/x86	380551-001
	Windows NT/Alpha	380552-001
	Sun Solaris	380554-001
	SGI IRIX	380556-001
	IBM AIX	380558-001
	HP9000/800 HP-UX	380557-001
	Tru64 UNIX	380553-001
	OpenVMS	380555-001
	NetWare	380559-001
	Linux/ProLiant	160088-B21
	Linux/Alpha	160087-B21

OPTIONS *(continued)*

Upgrade kits for existing kit customers	Windows 2000/ProLiant/x86, Windows NT/ProLiant/x86 Upgrade Kit	380551-001
	Windows NT/Alpha Upgrade Kit	165983-B21
	Sun Solaris Upgrade Kit	165985-B21
	SGI IRIX Upgrade Kit	165987-B21
	HP9000/800 HP-UX Upgrade Kit	165986-B21
	Tru64 UNIX Upgrade Kit	165979-B21
	OpenVMS Upgrade Kit	165980-B21
	NetWare Upgrade Kit	165984-B21
Host Bus Adapters	64 Bit PCI to FC HBA for Windows use with Windows NT, Windows 2000	176479-B21
	64 Bit PCI to FC HBA for Tru64, OVMS	168794-B21
	64 Bit 66Mhz FC HBA for Novell FC-AL, switch via FL port	120186-B21
	FC PCI HBA for Linux/Alpha, Linux/ProLiant	167432-001
	FC SBUS HBA/64 for Sun SBUS	123503-001
	FC PCI HBA for Sun PCI	380576-001
	FC PCI HBA for IBM	149841-B21
	FC PCI HBA for Windows 2000, Windows NT,Tru64,OVMS	380574-001
	FC PCI LC HBA for Novell	223180-B21
Optional Software Visit www.compaq.com for more options.	Secure Path V3.0 multi-path for NT	165989-B21
	Secure Path multi-path for WNT V2.0	380594-001
	Secure Path V2.0 for Sun (FC-AL)	165991-B21
	Secure Path V2.0 for Sun (FC-SW)	See www.compaq.com for latest information.
	Enterprise Volume Manager for NT	160094-B21
Fibre Channel Switches	Fibre Channel SAN Switch, 16 port	158223-B21 (Mounting bracket sold separately below)
	Fibre Channel SAN Switch/16 (supports Quickloop) - Bundle	253705-001
	Fibre Channel SAN Switch, 8 port	158222-B21 (Mounting bracket sold separately below)
	Fibre Channel SAN Switch/8 (supports Quickloop) - Bundle	253704-001
	FC SAN Switch Retma/Metric Mounting Bracket	167365-B21
	FC SAN Switch Redundant Power option	160407-B21
Fibre Channel Hubs	Fibre Channel Hub 12 with universal mounting for 41U/42U	295573-B22 (Includes mounting bracket)
	Fibre Channel Hub 7 order mounting bracket separately	234453-001
	Hub 7 Mounting Kit Universal kit for 41U/42U	136127-B21

OPTIONS *(continued)*

GBICS for Hubs/Switches	FC Short wave GBIC	380561-B21
	FC Long Wave GBIC	127508-B21
	FC Connection Kit 3 SW GBICS, 2 (2 meter) Cables	380579-B21
	FC Connection Kit 2 SW GBICS, 2 (2 meter) Cables	380596-B21
Cables, Cable Kits	Expansion Cables Kit	380563-B21 (For pedestal or rack expansion connections)
	FC Short Wave 2-Meter Cable	234457-B21
	FC Short Wave 5-Meter Cable	234457-B22
	FC Short Wave 15-Meter Cable	234457-B23
	FC Short Wave 30-Meter Cable	234457-B24
	FC Short Wave 50-Meter Cable	234457-B25
***StorageWorks* Disks in SBBs**	36-GB 10K rpm *StorageWorks* Disk	159138-001/DS-RZ1FC-VW
	18-GB 10K rpm *StorageWorks* Disk	380589-B21/DS-RZ1DE-VW
	9-GB 10K rpm *StorageWorks* Disk	380588-B21/DS-RZ1DD-VW
	36-GB 7200 rpm *StorageWorks* Disk	147599-001/DS-RZ1FB-VW
	18-GB 7200 rpm *StorageWorks* Disk	147598-001/DS-RZ1EA-VW
	9-GB 7200 rpm *StorageWorks* Disk	147597-001/DS-RZ1DA-VW
Rack 9000 Family for RA8000 Rackables See www.compaq.com for detailed information.	Compaq Model 9000 Family Racks	
	9142 42U Rack (Opal)	120663-B21
	Side Panel (Opal)	120670-B21
	Rack Stabilizer	120673-B21
	Multi-Bay Kit	120669-B21
	Fan Kit 110/220V	120677/678-B21
	Blank Panel Kit (4)	169940-B21
	PDU DOM Low	295363-001
	PDU DOM 16 Amp	295363-002
	PDU DOM 32 Amp	295363-003

OPTIONS *(continued)*

Rack 7142 for RA8000 Rackables	Compaq Model 7142 Rack (Beach Gray)	165753-001
	Power Distribution for model 7142 – Low Voltage	295363-001
	Power Distribution for model 7142 – High Voltage	295363-002
	Model 7142 VR Side Panel	165652-001
	Model 7142 Rack Stabilizer	189907-001
	Model 7142 Rack VR Baying Frame Kit	165664-001
ESA 12000 Cabinets for Rackable RA8000, options	Retma ESA 12000 41U Cab (Blue) 1PDU, 60 Hz	125359-B21
	Retma ESA 12000 41U Cab (Opal) 1PDU, 60 Hz	125360-B21
	41U Cabinet Power Distribution Unit, 60 Hz	380582-001
	41U Cabinet Joiner Kit (Blue)	380584-B21
	41U Cabinet Joiner Kit (Opal)	380584-B22
	41U Cabinet Filler Kit	380585-B21
Storage Controller options	HSG80 Storage Controller with 64-MB cache	380671-B21
	HSG80 Storage Controller with 256-MB cache	380672-B21
	Controller Cache (2 x 32 MB)	380673-B21
	Controller Cache (2 x 128 MB)	380674-B21
	Single external cache battery	380566-B21
	Dual external cache battery	380567-B21
Storage Enclosure options	180-Watt power supply	380565-B21
	AC Power Distribution , 2nd optional	380564-B21
	Dual-speed replacement fan kit (Blue)	380573-B21
	Dual-speed replacement fan kit (Opal)	380573-B22
	Environmental Monitor Unit (EMU)	380571-B21
	Power Verification and Addressing (PVA)	380572-B21

OPTIONAL SERVICES AND SUPPORT AVAILABLE

Software Product Services (recommended for all installations)

- Telephone support
- New version update services, including license and media/documentation subscription services

Hardware Product Services

- Installation services
- Response time upgrades during the warranty period
- Post-warranty coverage
- RAID setup and performance consulting via statement of work

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PHYSICAL DATA

Model	RA8000 Fibre Channel		
Controller Model	HSG80		
Controller Cache	64, 128, 256 and 512 MB		
Battery Backup for Cache	Yes		
Controller Software	Array Controller Software (ACS) V 8.3 or later		
Host Interface	Optical Fibre Channel Switched Fabric (FC-SW) and Arbitrated Loop (FC-AL) are supported.		
Host Ports per Controller	2, multi-bus with transparent failover		
Drive Interface	16-bit SE Wide Ultra-SCSI		
	6 per controller or controller pair		
RAID Levels	0, 1, 0+1, 3/5 and partitioning		
Maximum Disks Supported	72 per controller pair		
Non-RAID JBOD Support	Yes		
O/S Support (refer to support schedule)	Windows 2000, Windows NT, NetWare, Tru64 UNIX, Open VMS, Sun Solaris, SGI IRIX, HP-UX, Linux		
Sustained I/O Rate	Over 24K IOPS per controller pair		
Redundant Fans	Yes. N+1 standard		
Redundant Power Supplies	Yes. N+1 standard, N+N optional		
Environmental Monitoring Unit	Yes. Monitors power and temperature		
Regulatory Approvals	UL, CSA, TUV, FCC, CE MARK, CTICK		
Management Software	*StorageWorks* Command Console (SWCC)		
Physical Characteristics		**Installed Dimensions**	**Shipping Dimensions**
	Height	35.25 in/895 mm	45.5 in/1,156 mm
	Width	19 in/482.6 mm	38.5 in/978 mm
	Depth	21.25 in/539.75 mm	29 in/737 mm
	Weight	225 lbs/102 kg	298 lbs/135 kg
Operating Environment	Power Required	110 to 240V ac., 50/60 Hz, Single Phase, 12A/6A	
	Heat Dissipation	3070 BTUs/hr	
	Temperature	Optimal	64° to 74°F/18° to 24°C,
		Minimum Required	50° to 104°F/10° to 40°C
	Altitude	Up to 8,000 ft/2438 m	
	Air Quality	Not to exceed 500,000 particles per cubic foot of air at a size of 0.5 micron or larger	